

I claim:

1. An apparatus for simulating human blood pressure cycles and providing a tactile interface comprising:

an element to generate pressurized fluid;

a pressure vessel containing the pressurized fluid whereby a human can sense, through touch, pressure amplitudes within the pressure vessel;

a pressure control element to control pressure levels within the pressure vessel;

an electronic control unit to interface with the fluid pressure control element to maintain simulated diastolic and systolic blood pressure levels within the pressure vessel.
2. The apparatus of claim 1 wherein the fluid is a gas.
3. The apparatus of claim 1 wherein the fluid is a substantially segregated mixture of gas and liquid.
4. The apparatus of claim 1 wherein the pressure vessel containing the pressurized fluid further includes at least one moveable surface.
5. The apparatus of claim 1 wherein the electronic control unit controls the simulated human blood pressure cycle periodicity within the pressure vessel.
6. The apparatus of claim 1 further comprising at least one pressure sensor to determine the pressure level within the pressure vessel.
7. The apparatus of claim 1 wherein the fluid pressure control element comprises an electromechanically actuated pressure regulator.

8. The apparatus of claim 1 wherein the fluid pressure control element comprises an electric solenoid controlled valve system.
9. The apparatus of claim 1 wherein the element to generate pressurized fluid is at least one electric powered pump.
10. The apparatus of claim 1 wherein the pressure vessel comprises an elastomeric, hollow bulb that can be held in a human hand and internal pressure amplitudes of fluid within the bulb are sensed by human touch.
11. The apparatus in claim 10 further comprising an incompressible member positioned within the elastomeric hollow bulb such that substantial portions of the internal surfaces of the bulb are held in contact with the incompressible member by manually squeezing the bulb.
12. The apparatus of claim 1 wherein the pressure vessel comprises a piston-cylinder apparatus whereby the force on the piston is sensed by human touch.
13. The apparatus of claim 1 wherein the pressure vessel comprises an inflatable cuff whereby the pressure inside the cuff is sensed by human touch.
14. The apparatus of claim 1 wherein the pressure vessel is comprised of an elastic walled, closed tube whereby the pressure inside the tube is sensed by human touch.
15. The apparatus of claim 1 further comprising at least one user operable control to select minimum and maximum limits of pressures within the pressure vessel to simulate diastolic and systolic blood pressure levels.

16. The apparatus of claim 1 further comprising at least one user operable control to select the simulated blood pressure cycle periodicity.
17. The apparatus of claim 1 further comprising an electronic interface circuit to connect with an electronic sphygmomanometer to receive diastolic and systolic blood pressure level data and pulse rate data as measured by the electronic sphygmomanometer.
18. The apparatus in claim 17 whereby at least the diastolic and systolic blood pressure level data are used to set a minimum amplitude and maximum amplitude, respectively, of cyclic pressure levels within the pressure vessel.
19. An apparatus for simulating human blood pressure and providing a tactile interface comprising:
 - an element to generate pressurized fluid;
 - a pressure vessel containing the pressurized fluid having at least one moveable surface whereby a human can sense, through touch, pressure amplitudes within the pressure vessel;
 - a visual indicator to display indicia which specify pressure amplitudes within the pressure vessel.
20. The apparatus of claim 19 wherein the fluid is a gas.
21. The apparatus of claim 19 wherein the fluid is a substantially segregated mixture of gas and liquid.
22. The apparatus of claim 19 wherein the element to generate pressurized fluid is at least one manually operated pump.

23. The apparatus of claim 19 wherein the pressure vessel comprises an elastomeric, hollow bulb that can be held in a human hand and internal pressure amplitudes of fluid within the bulb are sensed by human touch.
24. The apparatus of claim 19 wherein the pressure vessel comprises a piston-cylinder apparatus whereby a pressure induced force on the piston can be sensed by human touch.
25. The apparatus of claim 19 wherein the pressure vessel comprises an inflatable cuff whereby the pressure inside the cuff is sensed by human touch.
26. The apparatus of claim 19 wherein the pressure vessel comprises an elastic wall, closed tube whereby the pressure inside the tube is sensed by human touch.
27. The apparatus of claim 19 whereby the visual indicator comprises an electronic digital display.
28. The apparatus of claim 19 whereby the visual indicator comprises an analog pressure gauge.
29. An apparatus for simulating human blood pressure comprising:

a means to generate pressurized fluid;

a vessel containing the pressurized fluid having at least one moveable surface whereby a human can sense, through touch, pressure magnitudes of the pressurized fluid acting upon the moveable surface;

a control means to control pressure levels within the vessel.

30. The apparatus of claim 29 wherein the fluid is a gas.
31. The apparatus of claim 29 wherein the fluid is a substantially segregated mixture of gas and liquid.
32. The apparatus of claim 29 whereby the means to generate pressurized fluid includes at least one electric pump.
33. The apparatus of claim 29 whereby the means to generate pressurized fluid is at least one manually operated pump.
34. The apparatus of claim 29 further comprising a visual pressure level indicator including an electronic digital display.
35. The apparatus of claim 29 further comprising a visual pressure level indicator including an analog display.
36. A method for conveying by touch, to a human subject, the level of pressure within a pressurized vessel comprising:
- generating pressurized fluid;
- regulating pressure levels of the pressurized fluid within the pressurized vessel indicative of a simulated human blood pressure cycle;
- containing the pressurized fluid in the pressurized vessel whereby a human subject can sense the magnitude of the pressurized fluid therein by touching of the pressurized vessel.
37. The method of claim 36 wherein the fluid is a gas.

38. The method of claim 36 wherein the fluid is a substantially segregated mixture of gas and liquid.

39. An apparatus for simulating human blood pressure cycles comprising:

a device to generate pressurized fluid;

a chamber containing the pressurized fluid having a distendable surface through which a human can sense, through touch, fluid pressure amplitudes within the chamber;

a fluid pressure control element to control pressure levels within the chamber;

an electronic control unit to interface with the fluid pressure control element to maintain simulated diastolic and systolic blood pressure levels within the chamber.

40. The apparatus of claim 39 wherein the fluid is a gas.

41. The apparatus of claim 39 wherein the fluid is a substantially segregated mixture of gas and liquid.

42. An apparatus for simulating human blood pressure and providing a tactile interface comprising:

a first elastomeric hollow bulb to pressurize fluid by manual compression of the bulb;

a second elastomeric hollow bulb pneumatically connected to the first elastomeric hollow bulb such that the pressure in the second bulb is controlled by the amount of manual compression of the first bulb;

the second elastomeric hollow bulb providing a tactile interface to a human subject whereby the human subject can physically sense fluid pressure internal to the second bulb by gripping the second bulb with at least one hand;

a visual indicator to display indicia which specifies pressure magnitudes within the second elastomeric hollow bulb.

43. The apparatus in claim 42 further comprising an incompressible member positioned within the second elastomeric hollow bulb such that substantial portions of the internal surfaces of the bulb are held in contact with the incompressible member.